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AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (original): A method of communicating via satellite in a system comprising a satellite having a first type antenna capable of transmission of communication signals to a region on the earth's surface and a plurality of earth stations disposed in said region, each earth station having a second type antenna capable of reception of said signals, said method comprising;

transmitting from said first type antenna multiple sub-beams within bandwidth allocated to a basic spot beam to said plurality of antennas in said region.

2. (original): A method as claimed in 1, where said sub-beams are transmitted within the frequency range of said basic spot beam.

3. (original): A method as claimed in 1, where said sub-beams are transmitted in a plurality to form a cluster, where said cluster has the same coverage area in said region as said basic spot beams.

4. A method as claimed in 1, where said sub-beams are transmitted by use of a phased array antenna.

5. (currently amended) ~~A method as claimed in 1~~A method of communicating via satellite in a system comprising a satellite having a first type antenna capable of transmission of communication signals to a region on the earth's surface and a plurality of earth stations disposed in said region, each earth station having a second type antenna capable of reception of said signals, said method comprising;

transmitting from said first type antenna multiple sub-beams within bandwidth allocated to a basic spot beam to said plurality of antennas in said region,

wherein the number of said sub-beams N are defined by the mathematical equation $N=i^2+j^2+ij$, where i and j are non-negative integers.

6. (original): A method as claimed in 1, wherein said sub-beams require less peak gain than said basic spot beam.

7. (original): A method as claimed in 3, where said clusters are transmitted so as to form a coverage area, said coverage area is a contiguous area defined by a matrix, where each facet of said matrix has interlocking borders, said borders defined as the contours of said spot beams.

8. (currently amended): ~~A method as claimed in 6, 1~~A method of communicating via satellite in a system comprising a satellite having a first type antenna capable of transmission of communication signals to a region on the earth's surface and a plurality of earth stations disposed in said region, each earth station having a second type antenna capable of reception of said signals, said method comprising;

transmitting from said first type antenna multiple sub-beams within bandwidth allocated to a basic spot beam to said plurality of antennas in said region,

wherein said sub-beams require less peak gain than said basic spot beam, and

where each sub-beam is defined by a contour level, said contour level determined by a required edge gain.

9. (original): A method as claimed in 8, wherein the gain relationship between said basic spot beams and said sub-beams can be defined by the equation $G_b - x_b = G_s - x_s$ where G_b and G_s refer to said peak gain values of said basic spot beams and said sub-beams respectively, and x_b and x_s denote the contour levels for which each beam is defined.

10. (original): A method as claimed in 9, wherein the peak gain of said antenna can be related to its half power beam width (hpbw), θ_3 by an the equation $G = 10\log(\frac{A}{\theta_3^2})$, where A is a constant partly defined by antenna efficiency.

11. (original): A method as claimed in 10, wherein the beamwidth of a phased array at an arbitrary contour level to its hpbw is determined by the equation $\theta_X = \theta_3 * 0.59 * x^{0.4806}$, where the units of the beamwidth are in degrees.

12. (original): A method as claimed in 9, wherein the contour levels of said basic and said sub-beams can be related to their beamwidths by the equation $9.612\log\left(\frac{x_s}{x_b}\right)+x_b-x_s=20\log\left(\frac{\theta_s}{\theta_b}\right)$, where θ_b is basic beamwidth and θ_s is sub-beam beamwidth.

13. (original): A method as claimed in 4, wherein said transmission originates from a low or medium earth orbiting system.

14. (original): A method as claimed in 1, wherein said basic beam has 3 or more dB of gain drop.

15. (original): A method as claimed in 1, wherein said sub-beam has less than 1 dB of gain drop. 16. A method as claimed in 1, wherein said sub-beams number 4 or more.

17. (original): A communications system comprising a satellite having a first type antenna capable of transmission of communication signals to a region on the earth's surface and a plurality of earth stations disposed in said region, each earth station having a second type antenna capable of reception of said signals;

a phased array antenna;

a digital beam former that produces multiple sub-beams within the parameters of a basic spot beam; and

an aperture sized to produce sub-beams with a gain drop of less than 3 dB.

18. (original): An system as claimed in 17, where said antenna and digital beam former are installed on a satellite.

19. (original): An system as claimed in 18, where said satellite is in low or medium Earth orbit.

20. (original): A satellite antenna comprising;

a phased array antenna;

a digital beam former operatively connected to said phased array and adapted to produce multiple sub-beams, each said sub-beam having a gain that at its peak is approximately equal to an edge gain.